Session: General Remote Sensing

The operational MODIS cloud optical and microphysical property product: Overview of the Collection 6 algorithm and preliminary results

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Operational Moderate Resolution Imaging Spectroradiometer (MODIS) retrievals of cloud optical and microphysical properties (part of the archived products MOD06 and MYD06, for MODIS Terra and Aqua, respectively) are currently being reprocessed along with other MODIS Atmosphere Team products. The latest "Collection 6" processing stream, which is expected to begin production by summer 2012, includes updates to the previous cloud retrieval algorithm along with new capabilities.

The 1 km retrievals, based on well-known solar reflectance techniques, include cloud optical thickness, effective particle radius, and water path, as well as thermodynamic phase derived from a combination of solar and infrared tests. Being both global and of high spatial resolution requires an algorithm that is computationally efficient and can perform over all surface types. Collection 6 additions and enhancements include: (i) absolute effective particle radius retrievals derived separately from the 1.6 and 3.7 μm bands (instead of differences relative to the standard 2.1 μm retrieval), (ii) comprehensive look-up tables for cloud reflectance and emissivity (no asymptotic theory) with a wind-speed interpolated Cox-Munk BRDF for ocean surfaces, (iii) retrievals for both liquid water and ice phases for each pixel, and a subsequent determination of the phase based, in part, on effective radius retrieval outcomes for the two phases, (iv) new ice cloud radiative models using roughened particles with a specified habit, (v) updated spatially-complete global spectral surface albedo maps derived from MODIS Collection 5, (vi) enhanced pixel-level uncertainty calculations incorporating additional radiative error sources including the MODIS L1B uncertainty index for assessing band and scene-dependent radiometric uncertainties, (v) and use of a new 1 km cloud top pressure/temperature algorithm (also part of MOD06) for atmospheric corrections and low cloud non-unity emissivity temperature adjustments.

We will summarize the Collection 6 changes and discuss example retrievals obtained from the archive. Examples will be shows for both pixel-level (Level-2) and gridded (Level-3) products.

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